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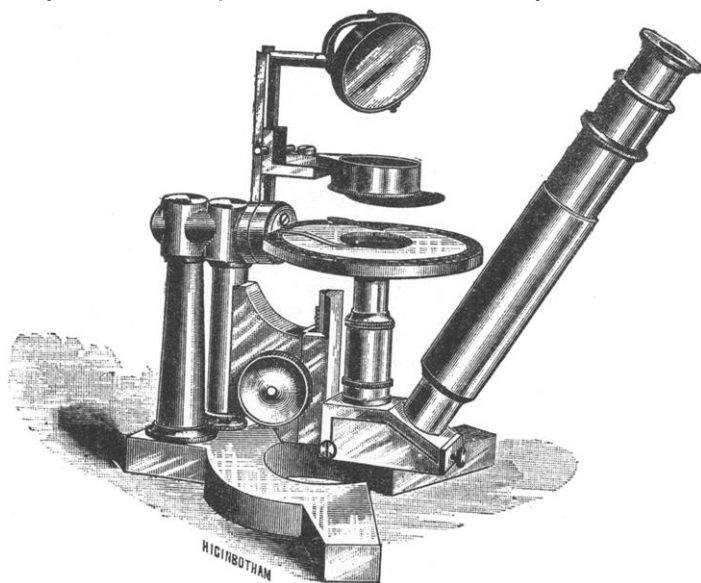
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TWO NEW COMBINED INVERTED AND VERTICAL MICROSCOPES.

EDWARD BAUSCH, Rochester, N. Y.

Our firm has several times been advised, by gentlemen who have made chemistry their special study, to undertake the manufacture of the inverted microscope as first introduced by Prof. J. Lawrence Smith, and some months ago we decided to do so.

While making the sketches and drawings of it, and seeking to embody in it those improvements which are to-day so essential in a



microscope for scientific research, the thought occurred to me that if the inverted microscope could in some manner be combined with a vertical or be made convertible into one, it would prove to be not only a great convenience in the study of chemistry but would tend to bring it into more general use and thus allow others who are working in other directions to enjoy the advantages which I have no doubt are contained in the inverted form.

The two instruments which I have with me are the outcome of this opinion, and as far as I can see accomplish the purpose perfectly. The general construction of the instrument in this inverted form is similar to that of Prof. Smith, but is supplied with modern rack and pinion for coarse adjustment, delicate micrometer screw for fine adjustment, and modern mirror-bar and substage adjustment. The form of the prism was dependent upon the obliquity at which the tube was placed, and its angles are respectively 57, 105, 48 and 150 degrees.

The transformation from the inverted to the vertical is made by swinging the instrument on a joint which is in the pillar on an axis in the center of the stage, into an upright position; the box which contains the prism is now removed by loosening the screw in the front, and after the tube is unscrewed from the nosepiece it is attached to it on the opposite side over the objective.

In another form the transformation is made by swinging the instrument on a joint which is contained between two pillars into the upright position. Both of them may be used vertical or at any inclination.

There is, perhaps, one point to which objection may be raised, and this lies in the fact that when used as an inverted microscope the image is inverted in one direction while it is erected in another. A number of persons think, however, that this will prove no difficulty, as a person will adapt himself to it as in any ordinary microscope. If it should prove, however, to be a serious objection the difficulty may be overcome by the interposition of an additional prism. It may, of course, be argued that this will depreciate the amount of light which is transmitted through the objective, but as that which is lost in the main prism is hardly appreciable I do not anticipate that the addition of another will materially affect it.

I firmly believe that if the advantages of the inverted form become more generally known it will be found to be very advantageous in studies in which it is not now used, and it seems to me that in such cases it would be doubly valuable, as it combines the two forms in one. Besides its value as a chemical microscope it is particularly valuable in the examination of all objects in water; and as a dissecting microscope, from the fact that examination may be made with almost any power, while there is no hindrance to the proper manipulation of the necessary implements.